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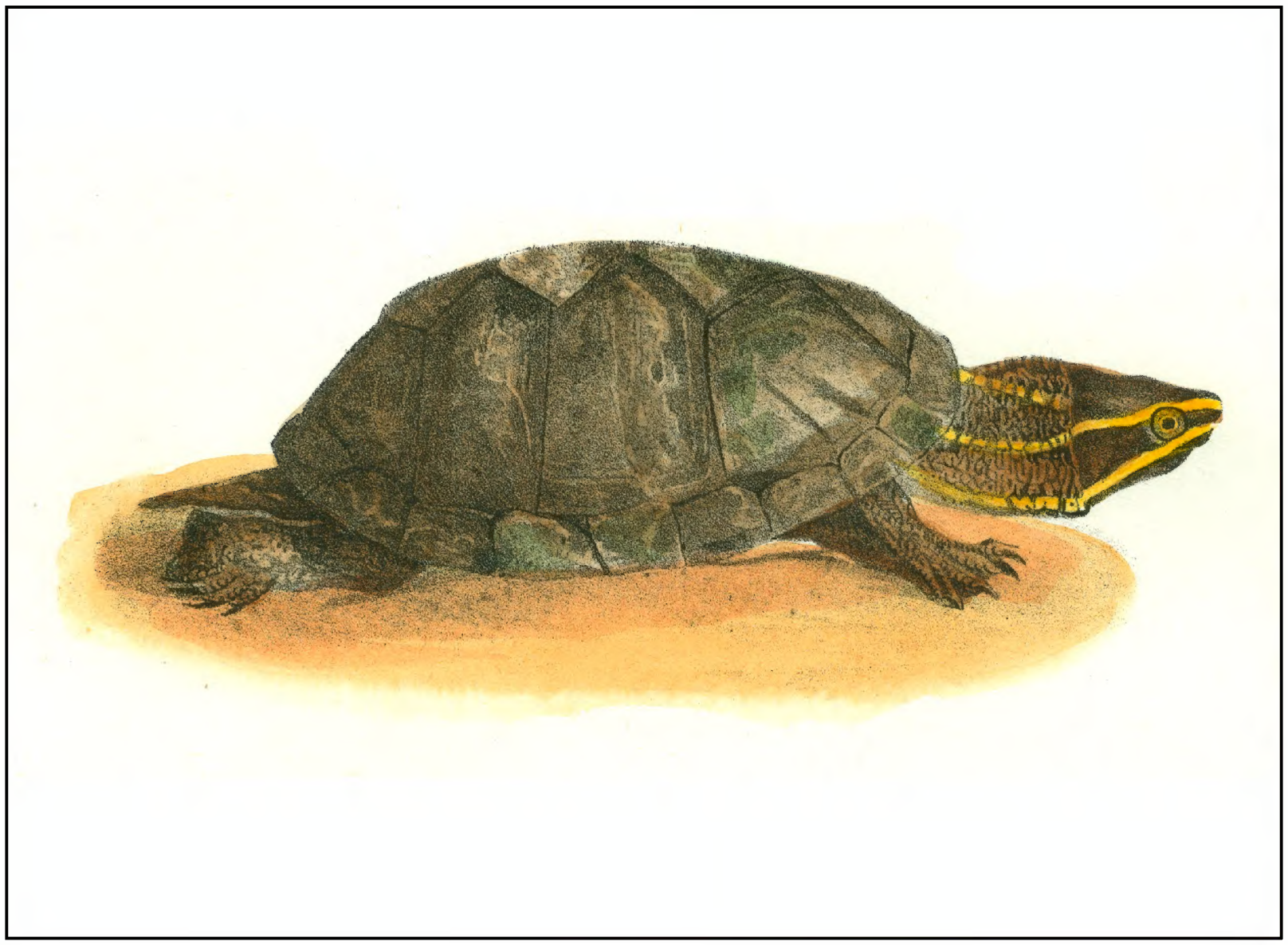

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Miscellanea Herpetologica Gabonica X . . . . . Olivier S. G. Pauwels, Jean-Louis Albert, Heather Arrowood, Cyrille Mvele, Morgane Casanova, Jean-Baptiste Dodane, James Morgan, Lyse Primault, Laure Thepenier and Jack N. Fenner 133

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Miscellanea Herpetologica Gabonica X

Olivier S. G. Pauwels [1], Jean-Louis Albert [2], Heather Arrowood [3], Cyrille Mvele [3], Morgane Casanova [4], Jean-Baptiste Dodane [5], James Morgan [6], Lyse Primault [7], Laure Thepenier [8] and Jack N. Fenner [9]

Abstract

We present new Gabonese locality records, ecological data or unpublished museum material for *Kinixys erosa* (Testudinidae), *Cycloderma aubryi*, *Trionyx triunguis* (Trionychidae), *Agama picticauda* (Agamidae), *Chamaeleo dilepis* (Chamaeleonidae), *Calabaria reinhardtii* (Boidae), *Grayia ornata*, *Thrasops jacksonii*, *Toxicodryas blandingii* (Colubridae), *Naja a. annulata* and *N. melanoleuca* (Elapidae), *Psammophis cf. phillipsii* (Lamprophiidae), *Natriciteres fuliginoides* and *N. olivacea* (Natricidae). We refer all Gabonese records of *Gonionotophis capensis* to *G. savorgnani* (Lamprophiidae). We provide the first report on Albert Schweitzer's snake collection at Lambaréné Hospital Museum, part of the oldest natural history collection settled in Gabon. We add one new snake species record to Woleu-Ntem Province and one reptile species each to Minkébé and Pongara national parks.

Keywords

Biodiversity, herpetofauna, herpetology, Testudines, Squamata, conservation, Gabon, Equatorial Africa, Albert Schweitzer, kyphosis.

Introduction

The book *Reptiles du Gabon* [Reptiles of Gabon] by Pauwels and Vande weghe (2008) provided an update on knowledge of the reptiles of the country, and stressed that much remained to be learned about the distribution, ecology and conservation status of most species. The series *Miscellanea Herpetologica Gabonica* was initiated in 2008 precisely to fill these gaps progressively, and to keep track of the literature bringing taxonomic changes and other new information for Gabon reptiles. The new observations presented here were opportunistically made during field work for the conservation NGOs *Organisation Ecotouristique du Lac Oguemoué* (OELO) and World Wildlife Fund (WWF) Gabon, or during recreational tourist activities. The observations made by JM took place during a photographic documentary on the work of anti-poaching patrols in northeastern Gabon (see https://jamesmorgan.co.uk/photo/gabon/). Those by JBD were done in the course of a bicycle journey from Switzerland to South Africa through 24 countries (see https://freewheely.com/).

Material and Methods

New photographic material was identified using the keys and morphological information provided by Pauwels and Vande weghe (2008). Abbreviations: Dept = Department; NP = National Park; Prov. = Province.

Results

Testudines
Testudinidae
Kinixys erosa (Schweigger, 1812)
On 9 August 2012, one of us (LP) observed two adult individuals *in copula* in a forest 1.5 km E of Camp Beti Castorène, Nyonié, Komo-Océan Dept, Estuaire Prov. (Figure 1). New locality record (Pauwels and Vande weghe, 2008; Pauwels, Chirio et al., 2017). It is known that nesting occurs throughout the year in Gabon but dated observations of mating in the wild are rare (Maran, 2006; Maran and Pauwels, 2005).

Figure 1. *Kinixys erosa* mating in Nyonié, Estuaire Prov., northwestern Gabon. Photograph by L. Primault.

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Figure 2. Live adult *Cycloderma aubryi* on the beach in Nyonié, Estuaire Prov., western Gabon. Photograph by L. Thepenier.

Figure 3. Live hunchback *Trionyx triunguis* caught in Oguemoué Lake, Moyen-Ogooué Prov., western Gabon. Photograph by H. Arrowood.

Trionychidae

Cycloderma aubryi (Duméril, 1856)

In December 2012, one of us (LT) photographed an adult individual near Camp Beti Castorène, Nyonié, Komo-Océan Dept, Estuaire Prov. (Figure 2). The turtle was found on its back, on the beach, exhausted by the waves. It probably reached the sea accidentally through the mouth of a nearby small river. It was caught and released in the river. New locality record (Maran and Pauwels, 2005). The other trionychid known from Gabon, *Trionyx triunguis*, was only recently recorded for the first time from Nyonié (Pauwels, Biyogho Bi Essono II et al., 2017).

Trionyx triunguis (Forskål, 1775)

A hunchback individual was caught by a fisherman as by-catch in a gill net in Ondimba (1°08'09.8"S, 10°00'38.6"E) on Oguemoué Lake, Ogooué & Lacs Dept, Moyen-Ogooué Prov. (Figure 3). The turtle, photographed on 22 June 2013 by one of us (HA), had then already been kept for several months by the fisherman in a barrel due to its deformity. Because of its kyphosis, it was believed by its owner to be a *génie* (a magical spirit) and to bring him good luck. He was however hoping to sell it. This turtle species was already known from Oguemoué Lake (Maran and Pauwels, 2005).

Squamata

Agamidae

Agama picticauda Peters, 1877

On 24 Dec. 2011 one of us (LP) photographed an adult pregnant female eating a ripe fruit of the tropical almond, *Terminalia catappa* Linnaeus (Combretaceae), on the *Boulevard de l'Indépendance* [Independence Boulevard] along the beach in Libreville, Estuaire Prov. (Figure 4). This exotic tree is invasive and is spreading along the beaches of northwestern Gabon (Pauwels and Vande weghe, 2005). The anthropophilic and omnivorous *Agama picticauda* is known to eat fruits, and was for instance observed to eat ripe papayas, *Carica papaya* Linnaeus (Caricaceae), in Libreville (Pauwels and Vande weghe, 2005; Pauwels and David, 2008), but there are few documented records of fruit consumption by this lizard species.

Chamaeleonidae

Chamaeleo dilepis Leach, 1819

In December 2012, one of us (MC) photographed an adult individual found along the restaurant of Pongara Lodge, Pongara NP, Komo-Océan Dept, Estuaire Prov. (Figure 5). We (MC and OSGP) examined the photograph of another adult individual found the same month in the same locality. First record for the NP (Pauwels, 2016).

Boidae

Calabaria reinhardtii (Schlegel, 1851)

See below under *Toxicodryas blandingii*.

Colubridae

Grayia ornata (Barboza du Bocage, 1866)

See under *Toxicodryas blandingii*.

Thrasops jacksonii Günther, 1895

On 15 December 2013 at 10:56 A.M. one of us (JBD) photographed an individual while cycling on the N2 road (1°16'38.6"N, 11°41'16.2"E) between Oyem and Mitzic, near Nkomelen, Woleu Dept, Woleu-Ntem Prov. The snake, found crossing a blacktop road through a dense secondary forest, showed a greenish head and a body barred with yellow and black, typical of the young of

Figure 4. Adult female *Agama picticauda* eating a tropical almond in Libreville, Estuaire Prov., western Gabon. Photograph by L. Primault.

Figure 5. Live adult *Chamaeleo dilepis* in Pongara NP, Estuaire Prov., western Gabon. Photograph by M. Casanova.

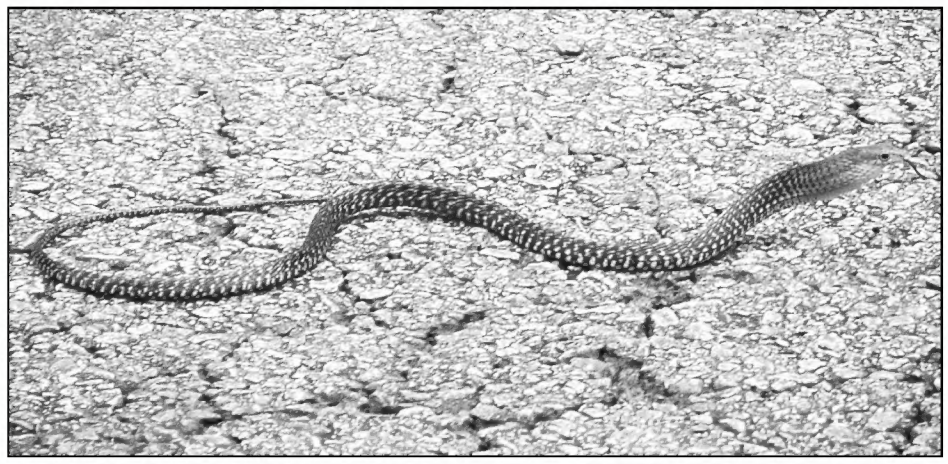

Figure 6. Young *Thrasops jacksonii* crossing a road between Oyem and Mitzic, Woleu-Ntem Prov., northern Gabon. Photograph by J.-B. Dodane.

this species (Figure 6). New prov. record and second record for Gabon. This species was only recently confirmed from Gabon, and was previously known only from a single young individual from Ivindo NP (Carlino and Pauwels, 2013).

Toxicodryas blandingii (Hallowell, 1844)

The buildings along the Ogooué River in Lambaréné where the Alsatian medical doctor and theologian Albert Schweitzer (1875–1965) and his team practiced have been preserved and constitute today the Schweitzer Hospital Museum (*Ancien Hôpital Schweitzer*). In July 2001 one of us (OSGP) examined Schweitzer's small natural history collection housed in the museum. Among others, it contained three whole snake specimens, from which precise scale counts and measurements could not be recorded, since they are kept in formalin in old sealed jars. They could however be identified with certainty thanks to their characteristic color patterns and the scalation characters visible through the glass: one adult *Calabaria reinhardtii*, one juvenile *Toxicodryas blandingii* and one adult *Grayia ornata*. These well preserved specimens were unfortunately without locality labels. We could find no mention of these particular specimens in Schweitzer's publications, in spite of numerous references to snakes in the hospital compounds and surroundings (Schweitzer, 1950). It is however most probable that these specimens were collected in the direct surroundings of the hospital. These three snake species are indeed well known and common in Lambaréné (Mocquard, 1897a-b; Boulenger, 1909). These jars were re-examined by another of us (HA) in May 2017, and the specimens' condition has much degraded within a dozen years, due to desiccation and exposure to light (Figure 7). Although modest,

Figure 7. Natural history collection of Dr Albert Schweitzer in his historical hospital in Lambaréné, Moyen-Ogooué Prov., western Gabon. Photograph by H. Arrowood. The first jar on the left contains a juvenile *Toxicodryas blandingii*, the second an adult *Grayia ornata* and the fourth an adult *Calabaria reinhardtii*.

this natural history collection has a certain historical value, as, besides having been gathered by Dr. Schweitzer, it includes the oldest herpetological collection housed in Gabon.

On 11 Oct. 2014 one of us (CM) photographed a dead adult *T. blandingii* , which had been killed by villagers, in Tsam Tsam Village (1°06'54.5"S, 10°01'18.0"E), Ogooué & Lacs Dept, Moyen-Ogooué Prov. (Figure 8). New locality record (Pauwels and Vande weghe, 2008). Dewynter et al. (2017) illustrated two adult individuals from Tsamba-Magotsi Dept, Ngounié Prov. One was caught in *Grotte Dimany* [Dimany Cave], confirming that caves are commonly used by this snake in Gabon (Pauwels and Vande weghe, 2008; Pauwels, Carlino et al., 2016). To date, only two snake species have been recorded from caves in Gabon, *Toxicodryas blandingii* and *Bitis gabonica* (Duméril, Bibron & Duméril, 1854) (Pauwels, Carlino et al., 2017).

Elapidae

Naja annulata annulata Buchholz & Peters in Peters, 1876

In June 2012 one of us (JM) photographed an adult individual killed by villagers in a river in the buffer zone of the southeastern part of Minkébé NP. Several photos of the snake were taken, showing 23 smooth dorsal scale rows at midbody, the vertebral one not enlarged. As is typical for the species, the banded dorsal pattern is very contrasted throughout the body and tail, with the black rings fully encircling the body. The beheaded snake was skinned, eviscerated and cooked on a fire to be eaten (Figure 9). First record for the park (Pauwels, 2016).

Figure 8. Dead adult *Toxicodryas blandingii* in Tsam Tsam, Moyen-Ogooué Prov., western Gabon. Photograph by C. Mvele.

Figure 9. Adult *Naja a. annulata* killed for food consumption in the buffer zone of Minkébé NP, northern Gabon. Photograph by J. Morgan.

Figure 10. Adult *Naja a. annulata* accidentally crushed and killed by a pirogue at the Tsam Tsam ecotourism site, Moyen-Ogooué Prov. Photograph by H. Arrowood.

On 16 July 2016 one of us (HA) photographed an adult individ ual accidentally crushed and killed when a dugout pirogue was pulled up onto the sand at the Tsam Tsam ecotourism site near Platform Palmiste (1°06'27.0"S, 10°01'38.1"E), Ogooué & Lacs Dept, Moyen-Ogooué Prov. (Figure 10). New locality record (Pauwels and Lavoué, 2004; Pauwels and Vande weghe, 2008). It is the first time this peculiar cause of death is documented for a snake in Gabon.

Naja melanoleuca Hallowell, 1857
On 14 November 2013 one of us (HA) photographed an adult individual in the Tsam Tsam ecotourism site (1°06'27.0"S, 10°01'38.2"E), at the southern tip of Oguemoué Lake, Ogooué & Lacs Dept, Moyen-Ogooué Prov. Its opaque eyes indicate a pre-shedding condition, and the individual seemed skinny and in poor health (Figure 11). It did not move for at least a day, and appeared quite unconcerned about human activities in close proximity for a platform construction. New locality record and southernmost record within Moyen-Ogooué Prov. (Pauwels and Vande weghe, 2008; Pauwels, 2017).

Lamprophiidae
Psammophis cf. phillipsii (Hallowell, 1844)
On 12 August 2012 one of us (LP) photographed an adult individual between the beach and a bungalow in a tourist camp in Nyonié (Camp Beti Castorène), Komo-Océan Dept, Estuaire Prov. It raised its neck above the ground (Figure 12), noticed that there were people around, and slowly retreated into a large grass tuft. According to LP's observations, the species is locally common. New locality record (Pauwels and Vande weghe, 2008; Pauwels, Le Garff et al., 2016).

Figure 12. Adult *Psammophis cf. phillipsii* in Nyonié, Estuaire Prov., northwestern Gabon. Photograph by L. Primault.

Figure 11. Adult *Naja melanoleuca* near Oguemoué Lake, Moyen-Ogooué Prov., western Gabon. Photograph by H. Arrowood.

Natricidae
Natriciteres fuliginoides (Günther, 1858)
CM photographed on 17 June 2013 an adult individual that had been killed and decapitated by villagers in Tsam Tsam Village (1°06'54.5"S, 10°01'18.0"E), Ogooué & Lacs Dept, Moyen-Ogooué Prov. Although the head and fore body were missing, the photographs clearly show a combination of characters that is unique to this species: brown dorsum with two paravertebral lines of small white vertical stripes separated from each other by two or three dorsals, a white belly with the posterior border of each ventral and subcaudal black, 17 rows of smooth dorsal scales with the vertebral row not enlarged, a single anal and divided subcaudals. Like a large proportion of individuals of this species, it shows a broken and healed tail, with in its case only 11 subcaudals. New locality record (Pauwels and Vande weghe, 2008).

Natriciteres olivacea (Peters, 1854)
On 13 June 2017 one of us (JLA) encountered a dead subadult individual on a road along a small stream in a savanna area near SOCOBA crushing station in Franceville, Passa Dept, Haut-Ogooué Prov. The snake had been killed by villagers with a machete. Several photographs were taken (Figure 13), showing a round pupil, two internasals, two prefrontals, one loreal, one preocular, three postoculars, one anterior temporal, eight supralabials whose 4th and 5th border the orbit, ten infralabials whose first five are in contact with the anterior pair of sublinguals, 19 smooth dorsal scale rows with a vertebral row not enlarged, unkeeled ventrals, an olive brown dorsum with a wide dark brown stripe on the five dorsalmost rows edged on each side by a beige line, and a discontinuous line of beige dots on the 4th dorsal scale row. There is only one published record of this species in Haut-Ogooué Prov., from "Passa River region, affluent of Ogooue River" (Loveridge, 1958:37), most probably also within Passa Dept. Franceville is thus the first precise locality known for the species in the province. This species is rarely encountered in Gabon, unlike *Natriciteres fuliginoides*, which is one of the most commonly observed snakes in the country and is also known from Franceville (Loveridge, 1958:48; Pauwels and Vande weghe, 2008).

Discussion

Pauwels and Vande weghe (2008) regarded *Gonionotophis capensis* (Smith, 1847) and *G. savorgnani* (Mocquard, 1877) as

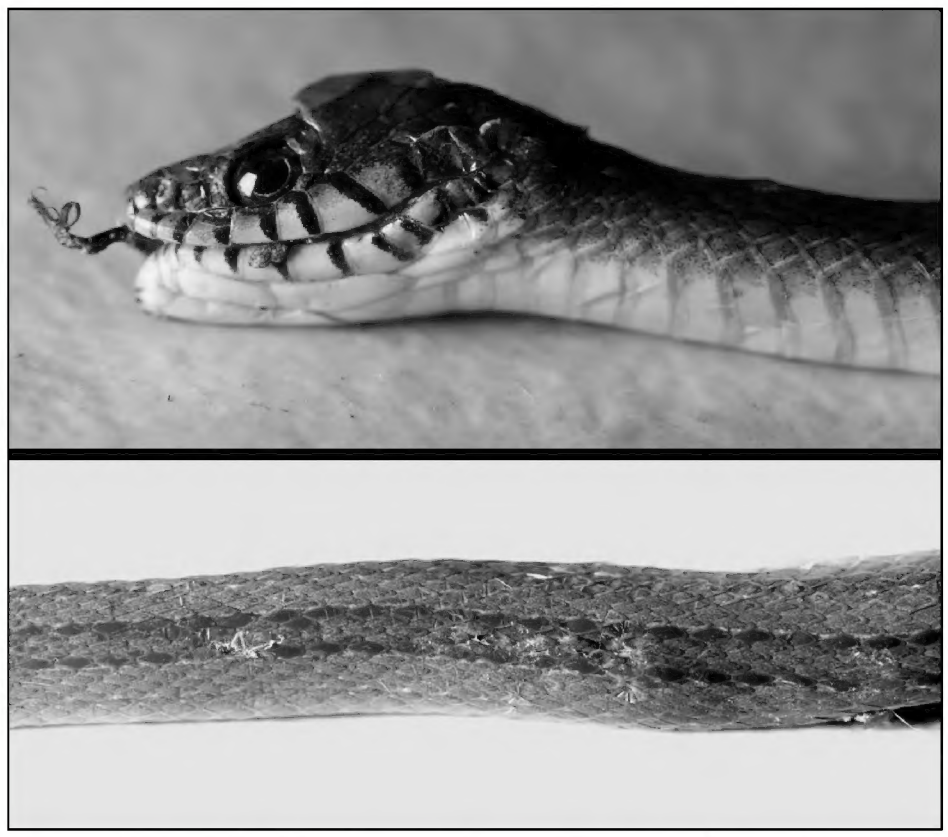

Figure 13. Subadult *Natriciteres olivacea* found dead on road in Franceville, Haut-Ogooué Prov., southeastern Gabon. Top: head. Bottom: dorsal midbody view, showing the characteristic striped color pattern. Photographs by J.-L. Albert.

synonyms pending the availability and analysis of further material. In their revision, Lanza and Broadley (2014) showed that the subtle characters separating these two species, i.e., mainly a white vertebral row in *G. capensis* absent in *G. savorgnani*, and a generally higher number of ventrals in *M. savorgnani* (211-241 vs. 193-224) were stable. An additional adult specimen from Tsamba-Magotsi Dpt, Ngounié Prov., examined and illustrated by Dewynter et al. (2017), showing 224 ventrals and a uniformly blackish dorsum, including the vertebral row, is referable to *M. savorgnani*. We consequently refer all records placed under *Mehelya capensis* by Pauwels and Vande weghe (2008) and Pauwels (2016) to *Gonionotophis savorgnani*. The latter species is thus currently recorded in Gabon from Haut-Ogooué, Ngounié and Ogooué-Maritime provinces.

Recent herpetological developments in Gabon include a project put in place in Lambaréné by Arrowood and Mvele (2017) aimed at eliminating local consumption of *Mecistops*; this is the first non-chelonian reptile conservation program in Gabon. It is to be noted that the cover of the 35 (2) (April-June 2016) volume of the Crocodile Specialist Group Newsletter shows a color photograph taken by Matthew Shirley, with the following caption: "Central African slender-snouted crocodile (*Mecistops* sp. nov. cf. *cataphractus*) basking on the Bongo River, Moukalaba-Doudou National Park, Gabon." The possibility that the Central African population of *Mecistops* represents a species distinct from the West African populations reinforces the importance of the conservation program in Gabon. It is also to be noted that Giuseppe Lolli (2017) successfully defended a Masters Degree thesis at Salento University in southern Italy on the current status of knowledge of the herpetofauna of Gabon's protected areas.

Boundenga et al. (in press) sampled reptiles sold as bushmeat in several provinces in Gabon to detect the presence of haemosporidian parasites. Among the five species sampled (*Pelusios castaneus*, *Kinixys erosa*, *Osteolaemus tetraspis*, *Varanus* "sp.," *Naja melanoleuca*, *Python sebae*), only the turtles revealed parasites (*Haemocystidium* sp.). This study follows another one on haemosporidian parasites in Gabonese reptiles by Boundenga et al. (2016), for which we have published additional locality information (Pauwels, Le Garff et al., 2016).

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OSGP thanks Larson Boundenga (CIRMF) and Wim Van Neer (IRSNB, Brussels) for providing useful information or literature. Observations in Lambaréné by OSGP were made while he was working for the WWF, and the support of André Kamdem Toham, then head of WWF Central African Regional Program Office, is warmly acknowledged. We are grateful to Mike Dloogatch for editorial support.

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Notes on the Herpetofauna of Western Mexico 17: Predation on *Rhinella horribilis* (Linnaeus, 1758) by two species, *Leptodeira maculata* (Hallowell, 1861) and *Caracara cheriway* (Jacquin, 1784), in the municipality of Cuauhtémoc, Colima, Mexico

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Abstract

We document for the first time predation on *Rhinella horribilis* (cane toad / *sapo gigante*) by *Leptodeira maculata* (southern cat-eyed snake / *escombrera del suroeste Mexicana*) and by *Caracara cheriway* (northern caracara / *quebranta huesos*). On 1 November 2016, at 08:16 h, we observed a *Leptodeira maculata* consuming *Rhinella horribilis* without regurgitation after consumption. The locality is strongly disturbed deciduous medium tropical forest. On 17 November 2016 at 10:11 h we observed a *Caracara cheriway* preying on a *Rhinella horribilis*. The bird was perched on a *Guazuma ulmifolia* (*cuaulote*). Both events took place at Buena Vista in the municipality of Cuauhtémoc, Colima, Mexico.

Resumen

Aquí documentamos por primera vez la depredación sobre *Rhinella horribilis* (cane toad/sapo gigante) por *Leptodeira maculata* (southern cat-eyed snake / escombrera del suroeste Mexicana) and *Caracara cheriway* (northern caracara /quebranta huesos). El 1ero de noviembre de 2016 a las 8:16 hrs., se observó un *Leptodeira maculata* consumir un *Rhinella horribilis* sin haber regurgitación después de su consumo. El sitio de observación es un bosque tropical mediano caducifolio fuertemente perturbado. El 17 de noviembre de 2016 a las 10:11 hrs observamos un *Caracara cheriway* consumiendo un *Rhinella*

Introduction

On two occasions during the course of a herpetological survey near the town of Buena Vista in the municipality of Cuauhtémoc, Colima, Mexico, from 1–20 November 2016, we observed predation on the cane toad, *Rhinella horribilis*.

Background: *Leptodeira maculata* (Hallowell, 1861)

Leptodeira maculata (southern cat-eyed snake / escombrera del suroeste Mexicana) ranges on the Atlantic versant from Tamaulipas to the Isthmus of Tehuantepec, including not only the states of Tamaulipas and Veracruz but also parts of San Luis Potosí, Hidalgo and Puebla. On the Pacific versant it ranges from Sinaloa in the north through Nayarit, Jalisco, Colima, Michoacán, Guerrero, Oaxaca and Chiapas into southwestern Guatemala (Duellman, 1958; Lemos-Espinal and Dixon, 2013; Johnson et al., 2015; Lemos-Espinal and Dixon, 2016). In Michoacán the species is found in the following physiographic provinces: Coastal Plain, Balsas Tepalcatepec Depression, Sierra Madre del Sur, Transverse Volcanic Axis and Central Plateau (Alvarado-Diaz et al., 2013). In Colima, it is found in two provinces: Coastal Plain and Sierra Madre del Sur.

Leptodeira maculata is a medium-sized snake in which the head is moderately distinct from the neck, the body is rounded, the pattern consists of dark brown or black blotches or spots on a cream to pale grayish brown ground color(ventral), and the tail is relatively short. The maximum recorded total length in males is 638 mm, and 810 mm in females. This species currently is placed in the family Dipsadidae (García and Ceballos, 1994; Lemos-Espinal and Dixon, 2016).

Although little is known about the diet of *L. maculata*, it is presumed to feed primarily on amphibians (García and Ceballos, 1994; Lemos-Espinal and Dixon, 2016). Specific food items that have been documented include: *Hypopachus variolosus* (as *H. caprimimus*) (Duellman, 1961: p. 53); *Smilisca baudinii* (Duellman and Trueb, 1966: p. 356); *Incilius* (as *Bufo*) *mazatlanensis* (Hardy and McDiarmid, 1969: p. 176); *Lithobates neovolcanica* (Cruz-Sáenz et al., 2010).

Leptodeira maculata is primarily nocturnal. In Colima, Mexico, it is found in tropical subdeciduous and deciduous forest (*bosque tropical baja subcaducifolio y caducifolio*), coastal grassland (*vegetación sabanoide*); grassland (*pastizal*), and aquatic and subaquatic vegetation (*vegetación semiacuática y acuática*), generally close to bodies of water (García and Ceballos, 1994; Lemos-Espinal and Dixon, 2016).

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Leptodeira maculata is assessed as Least Concern (LC) in the IUCN (2007) Red List; it is not endemic to Mexico and is listed as a species of special protection (Pr) under SEMARNAT (2010).

Background: *Caracara cheriway*

The northern caracara ranges from the southern United States, through Mexico and Central America, reaching the northern part of South America and some Caribbean islands. In Mexico it is distributed in Baja California Sur, on the Pacific slopes from Sonora to Chiapas, and along the Gulf of Mexico from Tamaulipas to the southwest and northwest of the Yucatán peninsula (Howell and Webb, 1995; Ferguson-Lees and Christie, 2006; Ramírez-Albores et al., 2017).

This species, also known as the caracara vulture, belongs to the family Falconidae. It shows no sexual dimorphism, and measures between 500 and 600 mm, with a wingspan of 1200 mm, and a weight of 1000–1300 g. Its flight is generally slow, although it can reach 65 km/h. They are excellent hunters, but most of the time they are scavengers (Ellis et al., 1988; Ramírez-Albores et al., 2017).

Caracara cheriway is a dietary opportunist that feeds on carrion and a variety of live prey, including insects (Bent, 1938; Richmond, 1976; Layne et al., 1977; Whitacre et al., 1982; Ellis et al., 1988; Morrison, Abrams et al., 2007; Morrison, Pias et al., 2007). Specific prey items that have been reported in the literature include *Alouatta palliata* (howler monkey) juveniles in Costa Rica (McKinney, 2009) and *Alligator mississippiensis* (American alligator) juveniles (Bent, 1938) in Florida. They frequently steal food from other creatures (kleptoparasitism) (Ellis et al., 1988, Rodríguez-Estrella and Rivera-Rodríguez, 1997; McNair et al., 2000; Partida and Rodríguez-Estrella, 2015).

This species inhabits open and semi-open arid and semi-arid areas, oak forests, grasslands, wetlands, tropical forests, and agricultural fields (Howell and Webb, 1995; Ferguson-Lees and Christie, 2006).

Caracara cheriway is listed as Least Concern (LC) in the IUCN (2007) Red List; it is not endemic to Mexico and is not listed in SEMARNAT (2010).

Background: *Rhinella horribilis* (Wiegmann, 1833)

Although the cane toads (*Rhinella horribilis* and *R. marina*) range from southern Texas to the Central Amazon, these toads also have established populations in the southern United States, Australia, Japan, Philippines, Taiwan, New Guinea, various Caribbean islands, and other islands in the Pacific (Pippet, 1975; Lever, 2001; Kidera et al., 2008), resulting in a hugely translocated invasive species, considered a pest and eliminator of local fauna (Easteal, 1981, 1985; Lever, 2001; Acevedo et al., 2016). These toads were introduced in many parts of the world for pest control in agricultural areas (Van Volkenberg, 1935; Oliver, 1949; Riemer, 1958; Mead, 1961; Krakauer, 1968; Easteal, 1981, 1985, 1986; Evans et.al., 1996), but because of their size and aggressive adaptive characteristics, they quickly became a problem (Lannoo, 2005). Australians have intensified their efforts to eradicate or minimize the effects of these toads. Many species endemic to the areas where these toads have been introduced have been adversely affected, especially those that are amphibian predators (Covacevich and Archer, 1975; Burnett, 1997; Catling et al., 1999; Pizzatto and Shine, 2009).

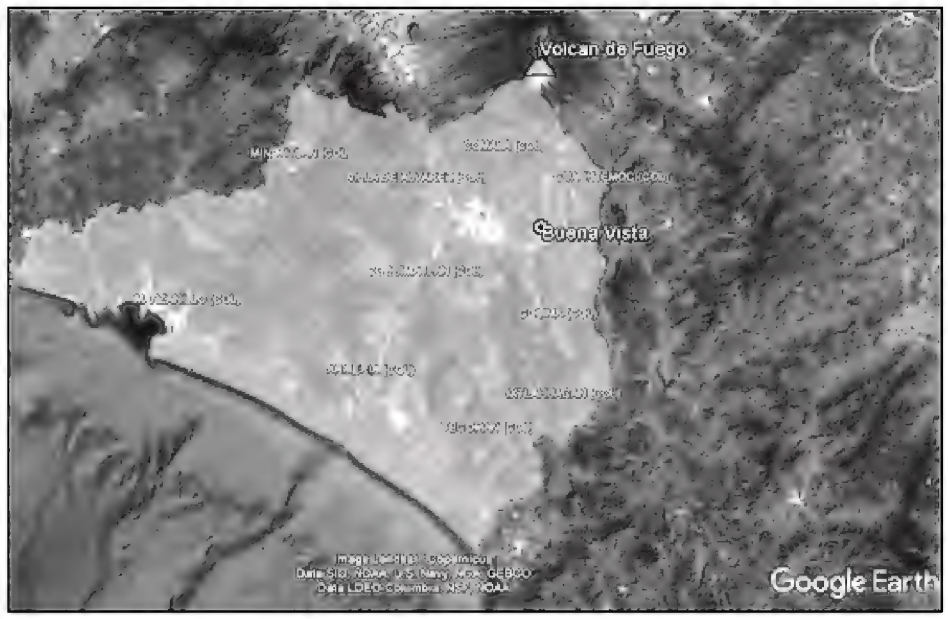
A specimen of *Rhinella horridus* from the area of the study. Photograph by Daniel Cruz-Sáenz.

Recently genetic and morphological studies on populations of South American cane toads suggested the existence of two distinct evolutionarily independent lineages. Acevedo et al. (2016) restricted *Rhinella marina* to the population east of the Andean cordillera and suggested *Rhinella horribilis* for the western populations. In Mexico *Rhinella horribilis* occurs on both the Pacific and Atlantic versants (Ochoa-Ochoa and Flores-Villela, 2006, Oliver-Lopez et al., 2009). The species can be found in most states of the country.

Rhinella horribilis is a very large and robust toad with prominently pitted, triangular parotoid glands. The head is wider than long. Supraorbital, loreal, preocular, supratympanic and postocular cranial crests are present, and the skin contains scattered warts. The tympanum is vertically oval, about half the length of the eye, and bordered posteriorly by the parotoid gland. These toads are nocturnal and live close to water bodies (García and Ceballos, 1994; Lemos-Espinal and Smith, 2007; Oliver-Lopez et al., 2009).

Cane toads utilize a broad range of prey items. They eat almost any invertebrate or vertebrate that can fit in their mouth. They are known to feed on ants, beetles, dragonflies, grasshoppers, true bugs, crustaceans, gastropods, vegetable parts, and even dog and cat food (Krakauer, 1968; Oliver-Lopez, 2009; Sampedro-Marin et al., 2011). Specific vertebrate food items include *Physalaemus pustulosus* (Guayaquil dwarf frog) (Duellman and Trueb, 1986), blind snakes (Pizzatto et al., 2012; Kelehear, 2014), *Passer domesticus* (house sparrow) in Australia (Beckmann and Pizzatto, 2011). Kelehear (2016) reported finding a hatchling *Trachemys scripta elegans* (red-eared slider) in the diet of *R. marina* (= *R. horribilis*) in Bermuda.

In Mexico this toad inhabits *bosque tropical subcaducifolio y caducifolio* (tropical subdeciduous and deciduous forest); riparian vegetation, *palmar* (palm forest), and *pastizal* (grassland). It is found close to water bodies, under logs, humus, rocks, and in holes in the ground (García and Ceballos, 1994; Oliver-Lopez et al., 2009). *R. horribilis* is found at altitudes up



Map indicating the location of Buena Vista in the municipality of Cuauhtémoc, Colima, Mexico.

Grassland in a strongly disturbed deciduous medium tropical forest community where the event occurred. Photograph by Erika Surgey García-Mata.

to 1000 m, but has been reported up to 2100 m (Wright and Wright, 1949) in Costa Rica. In the Mexican state of Colima, it inhabits three physiographic provinces, i.e., Coastal Plain, Sierra Madre del Sur, and Transverse Volcanic Axis.

Rhinella horribilis is not listed in the IUCN (2007) Red List catalog; it is not endemic to Mexico and is not protected in SEMARNAT (2010).

Background: Colima and Its Herpetofauna

The state of Colima is situated in the southwestern part of the Mexican republic, between the parallels of 19°31' N and 18°41' N and 103°29' W and 104°35' W. Colima occupies 5191 km^2; it is the 28th state in size and represents only 0.3% of Mexico's total surface area (Báez-Montes, 2016a). It is divided politically into 10 municipalities: Armería, Colima, Cómala, Coquimatlán, Cuauhtémoc, Ixlahuacán, Manzanillo, Minatitlán, Tecomán, and Villa Alvarado.

Some of the highest elevations in the state are Nevado de Colima (= Volcán de Fuego de Colima) at 3820 m, Sierra de Manantlán at 2420 m, Cerro Grande at 2200 m, and Cerro El Peon at 2014 m. Geologically, Colima's mountains comprise two major chains: the Neovolcánico Chain (18%) and the Sierra Madre del Sur (82%). The climate is mostly hot and subhumid, except in mountainous areas above 1000 m. The annual average temperature is 25°C. The rains appear during the summer, and total annual rainfall is approximately 900 mm. The state's population is 711,235 inhabitants (INEGI 2015; Báez-Montes, 2016a).

There are fourteen types of life-zones recognized in Colima: deciduous low tropical forest; deciduous high or medium tropical forest; low thorny evergreen forest (gallery forest); pine-oak forest; pine forest; oak forest; cloud forest; savannah; palm forest; mangrove forest; carrizal-tular; floating vegetation; grassland; and thorn scrub (Arévalo et al., 2016). The flora of the state is well studied, with 7500 species recorded, but with an endemism rate of only 1%. The state has four protected areas: 1) Reserva de la Biosfera Sierra de Manantlán; 2) Parque Nacional Nevado de Colima, Áreas de Protección Forestal y Refugio de la Fauna Silvestre; 3) El Jabalí; and 4) Las Huertas (CONANP, 2015; García et al., 2016).

According to the national forest inventory, the state contains representatives of seven of the most important plant communities of Mexico (Rzedowski, 1978; Palacio-Prieto et al., 2000). In addition, nearly half of its territory lies within the deciduous tropical forest community, which is part of one of the most biologically valuable ecoregions of our planet (Ecoregion 56: Olson and Dinerstein, 1998). Due to the floristic relevance of the Region Prioritaria Terrestre Manantlan–Volcán de Colima, this region has been incorporated under federal law for its protection (Arriaga et al., 2000, Báez-Montes, 2016b).

Unfortunately, Colima, has a very high rate of deforestation; by 1992 up to 25% of its territory had been deforested (Flores-Villela and Gerez, 1994). Based on Palacio-Prieto et al. (2000), 42.6% of the state's surface is now occupied by land devoted to agriculture and human settlements.

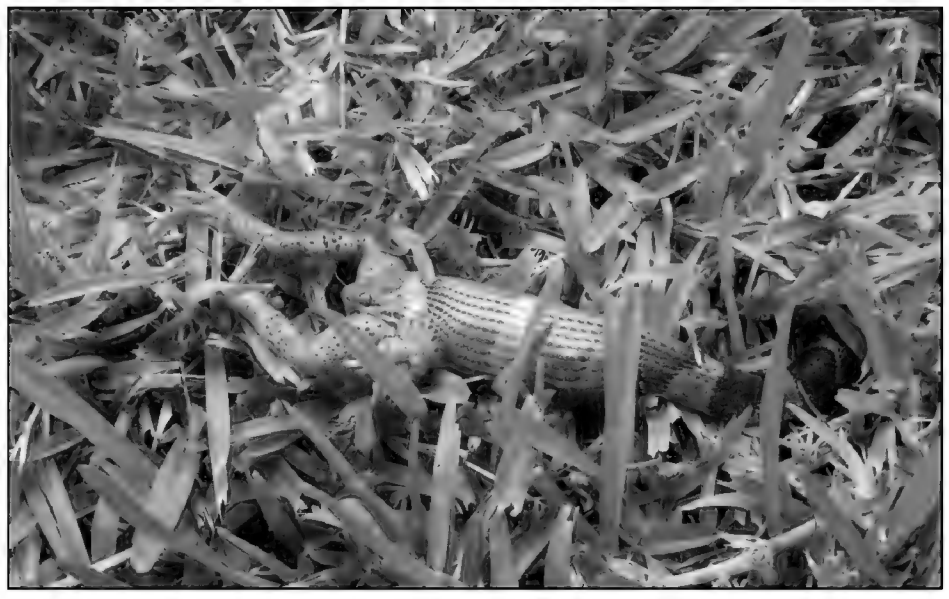
The most recent compilation of Colima's herpetofauna recorded 152 species, with 117 reptile species and 35 amphibian species. (Garcia et al., 2016). These 152 herpetological species represent 13% of the national total (1165), corresponding to 15% of reptiles and 10% of amphibians (Flores-Villela and Canseco-Marquez, 2004; Ochoa-Ochoa and Flores-Villela, 2006). In Colima there are 80 species endemic to Mexico, equivalent to 12% of the national total reported by Ochoa-Ochoa and Flores-Villela (2006).

The most diverse amphibian families in the state are Bufonidae (5 species), Eleutherodactylidae (8), Hylidae (11), and Ranidae (4), while the most diverse genera are *Craugastor* (4), *Lithobates* (4), *Ollotis* (3), and *Syrrhophus* (4) (García et al., 2016).

Family diversity for reptiles in the state stands as follows: Phrynosomatidae (14), Teiidae (6 especies), Colubridae (26 species), Xenodontinae (19 species), and Viperidae (8 species), with the most diverse genera being *Aspidoscelis* (5 species), *Sceloporus* (10 species) and *Crotalus* (6 species).

Results

While conducting a herpetology survey in the municipality Cuauhtémoc, Colima, in the locality of Buena Vista (19°15'40"N, 103°36'17"W, datum NAD27; elevation 666 m),



Leptodeira maculata eating a *Rhinella horribilis*. Photograph by Erika Surgey García-Mata.

Caracara cheriway eating a *Rhinella horribilis*: Photograph by Erika Sugey García-Mata.

we found a *Leptodeira maculata* (southern cat-eyed snake / *escombrera del suroeste Mexicana*) consuming a *Rhinella horribilis* (cane toad / *sapo gigante*). The event was observed on 1 November 2016 at 08:16 A.M. The snake took 32 minutes to consume the prey. There were no measurements or handling of the snake to avoid regurgitation. This locality is a strongly disturbed deciduous medium tropical forest community due to its use as grazing land and for growing sugarcane and rice.

Several days later, 17 November 2016, at 10:11 A.M., we found near the same locality a *Caracara cheriway* (northern caracara / *quebranta huesos*) preying on *R. horribilis* alongside the road that connects the city of Cuauhtémoc to the locality of Buena Vista (19°17'03"N, 103°35'56"W, datum NAD27; elevation 760 m). This event lasted until 10:20 A.M. The predator was perching on a *Guazuma ulmifolia* (Cuaulote) in the grassland of a medium tropical forest.

Discussion and Conclusions

The toxicity of the parotoid glands of some amphibians is well known (Oliver-Lopez et al., 2009; Antoniazzi et al., 2013). This toxicity is the result of bufotoxins, which can cause temporary paralysis or even death. In Australia, Phillips et al. (2003) identified 49 potential taxa that might attempt to prey on the invasive cane toads and could be affected by the toxicity of the species. They reported two snake species, *Tropidonophis mairii* (common keelbacks) and *Stegonotus cucullatus* (slaty-grey snakes) that showed high resistance to the toad's toxins. They suggested that cane toads' toxins could affect 30% of the Australian species that feed on anurans. A selective group of predators can consume adult bufonids, relying either on avoidance of areas of toxin concentration (dorsal skin and parotoid glands) or some resistance to the toxins (Schaaf and Garton, 1970; Corn, 1993). The latter would be the case for the genus *Leptodeira*.

Various other Australian authors have documented several vertebrate species that have been observed eating juvenile and adult cane toads; these include *Milvus migrans* (fork-tailed kites) (Lavery, 1969; Mitchell et al., 1995), ibises (Goodacre, 1947), koels (Cassells, 1970), tawny frogmouth owls (Freeland, 1985), crows, *Rattus rattus* (common rats) (Adams, 1967), and white-tailed water rats (St. Cloud, 1966). These animals have apparently learned to flip the toad on its back, slit its belly open and eat its insides, thereby avoiding the toxic skin (Freeland, 1985). In northern Australia, common keelbacks are unaffected by cane toad poison (Freeland, 1985).

Mexico harbors many snakes that are amphibian predators, such as *Adelophis*, *Amastridium*, *Coniophanes*, *Conophis*, *Drymarchon*, *Drymobius*, *Imantodes*, *Heterodon*, *Leptodeira*, *Leptophis*, *Nerodia*, *Oxybelis*, *Pseudoleptodeira*, *Thamnophis*, *Tretanorhinus* and *Xenodon* (Lee, 1996), any of these genera could be considered candidates as predators of *Rhinella horribilis*. Our observation confirms that *Leptodeira maculata* is a predator on cane toads.

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What You Missed at the July Meeting

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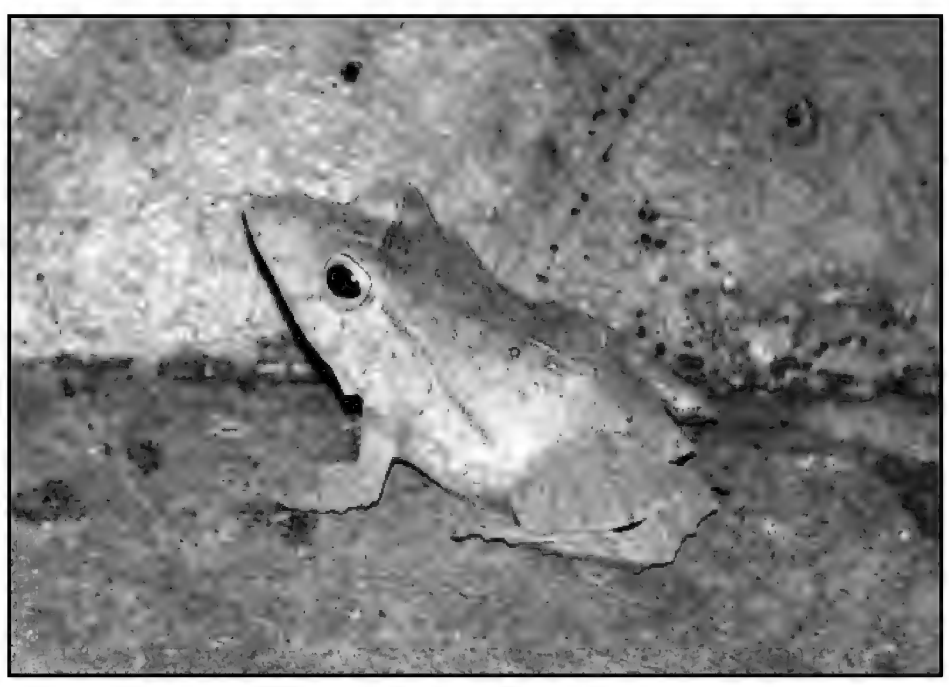
Jason Juchems titled his talk "Care and Breeding of Solomon Island Leaf Frogs (*Cornufer guentheri*)." Allow me to explain why my articles are no substitute for attending the meetings. I can never include all of the talk, so it is unlikely that you will gain enough through reading this article to wind up with a huge colony of these pointy-nosed frogs. I don't breed animals, so what I choose to leave out could be a vital piece of information that will cause all of your attempts at increasing their population to catastrophically fail. Not that any of you would take my writings as the last word on anything, but breeders should definitely beware.

Jason Juchems. Photograph by Dick Buchholz.

Jason Juchems is a busy man. He's an assistant principal, the IT director and transportation director for his school district, has served as a trustee for the city's library and has run for councilman of Pekin, Illinois. He's written a book on poison dart frogs, worked at a zoo, been a fifth grade teacher, worked with aquarium maintenance, and gives talks locally and nationally to interested groups and symposiums. He's the proud father of two kids, which he states as his most important job. And he breeds animals: frogs, turtles and lizards. I didn't hear him mention breeding snakes, but he probably has. He has bred several exotic frogs in his back yard. He keeps fish, grows orchids, and has a pet octopus. Over dinner he mentioned that he has 40 species (yes, species) of animals, down from 100 because he's cutting back a little. Because his summers are not quite so full as during the school year, he was nice enough to drive into Chicago and talk to us. He mentioned that it normally takes him 35 minutes to drive the 26 miles from his home to his work and he spent 20 minutes driving two miles trying to get to the meeting. He's not a city guy.

He breeds Solomon Island leaf frogs. According to Jason, these frogs are usually labeled SILFs. Being ex-military and a poor typist, I'm perfectly comfortable with acronyms so that's how I'm going to refer to them. One of his first slides showed a picture of his young son next to a hundred-pound *sulcata* that had been found in a central Illinois cornfield. Both share his home. We viewed a range map of SILFs, including all of the Solomon Islands except for the higher altitudes. The frogs are abundant where found and are listed as a species of least concern, but are a bit tricky to breed in captivity. They are direct developing frogs, going through the tadpole stage while in the egg and emerging as fully formed frogs. Jason lost all four of the first group of these frogs that he purchased, but another opportunity presented and he acquired some others.

Not having much information on the frogs, Jason researched the habitat of the Solomon Islands. Temperature and humidity are relatively constant in the islands, and Jason keeps his frogs at a constant 78°F when they're inside, but his first breeding success with SILFs was in a 180-gallon horse trough in his back yard. During the summer he's bred several other species in the ambient temperature and humidity of Central Illinois, occasion-



After 7 or 8 weeks SILFs begin to gain color. This one is a pretty greenish yellow. Photograph by Jason Juchems.

Lots of leaves are important for your SILF setup. Photograph by Jason Juchems.

Eggs laid on top of the substrate can be discarded as infertile. Viable eggs are buried. Photograph by Jason Juchems.

Jason uses a cleaned magnolia leaf to cover the eggs that he places on top of the substrate. Photograph by Jason Juchems.

ally spraying with a hose. Humidity is important but the frogs must have adequate ventilation. In the indoor cages he has automatic misting but maintains ventilation with screen covers and fans if needed. His lighting is on a 12-hour cycle.

Jason quarantines all of his new arrivals and has them tested for ranavirus and chytrid. He will euthanize any animals that test positive for ranavirus since it's incurable. He treats for chytrid whether or not tests come back positive. He thinks the slight cost involved in the treatment is easily offset by the assurance of healthy animals. SILFs tend to be aggressive. Jason has one female he's labeled the black widow because she tends to kill males. He recommends keeping groups of 1.2 or 1.3 in large (75-gallon) tanks. The large tanks are desirable because the frogs are strong jumpers and tend to lose their pointy snouts if they bang into glass too often. Males are the most difficult to obtain, and Jason doesn't really have an answer as to why, but the sex does not seem to be temperature dependent.

Eggs laid on top of the substrate are discarded because they will be infertile, but buried eggs are recovered and then put on top of substrate and under one magnolia leaf that he's cleaned with white vinegar. Jason finds that his hatch rate is greatly increased by not reburying the eggs. The clutch size usually ranges between 15 and 20, and the eggs hatch in 6–8 weeks. He doesn't feed the hatchlings for the first week, then starts them on fruit flies, but provides pinhead crickets after about another week. He finds the animals will not thrive if kept on fruit flies too long. He will keep them in the plastic hatching containers for up to two months.

Jason had many other tips for aspiring breeders. He uses hardwood mulch because coco fiber and fir tree bark breaks down too quickly. For $12 each he buys 50-lb. bags of Turface® MVP® (a brand of calcined clay pellets sold as a conditioner for baseball infields), rather than the smaller bags of the same substrate that sells as Pangea Hatch at higher prices. He purchased a microscope from Proscope that attaches to his phone so he can better monitor egg development. I was impressed by the care he takes of his animals and the environment. He uses gloves when handling frogs and when cleaning cages, changing them between cages. He not only treats his supply water, but also runs his wastewater through a chlorine shock tank to curtail the spread of any pathogens. Jason seems to be a careful, creative, and caring breeder and animal keeper who does research, learns from his mistakes, and thinks through solutions. His Facebook page is Poisonfrogs.net. He's posted a video of his presentation to the National Amphibian Expo on this same topic on YouTube. Search for Solomon Island Leaf Frogs Presentation. You haven't learned how to breed SILFs from this article, but perhaps you're motivated to learn more. We're glad that Jason came.

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Phud Buds

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Before offering any insights about the educated elite among us, I must first elucidate my own academic achievements. That won't take long. My approach to schooling can best be described in two words: minimal effort. During my freshman year of high school, my report cards carried more flags than an admiral's flagship. There was more red ink than black on those rascals. By the beginning of my sophomore year, my concerned parents grew staunchly proactive in their attempt to instill in me an appreciation for schooling. The gist of the one-sided deal that they cut me was that if I earned anything below a C on any given report card, I would not be allowed fun in any form until the next report card came along with a shot at redemption. They were put to the test when I received a D in geometry on that first report card. Thus it came to pass that from the middle of October to Christmas break, I served a nine-week sentence of hard labor at my father's toy and hobby shop, coupled with close scrutiny of every shred of homework that came and went. My parents also maintained close ties with my teachers throughout this purgatory. Said teachers did not hesitate to rat me out at the slightest infraction of their precious three Rs.

My grades suddenly took a turn for the better, and I was an honor roll student throughout my junior and senior years. (Wise personal choices with my coursework for those last two years of high school helped that cause considerably.) While my grades showed a marked improvement, my attitude did not. I *hated* school. They made me wear shoes. They made me dress nice. (Yup! There was a dress code back in those dark ages.) They made me sit still. They made me listen. They made me read stuff that I didn't care about, and then they made me write reports about what was read. When I graduated from high school, I entered a tool and die trade school, where I was forced to endure four more years of night classes, coupled with working a full-time day job, in order to earn my degree. In 1977, I received my sheepskin. I was officially registered with the federal Department of Labor as a tool and die maker. Now comes the most remarkable part of my education. *I have not been to school since*! That's right! I have just celebrated a major anniversary in life. Forty years of no class. We might even say I've earned a Ph.D. in staying out of school.

Given my educational background, I should probably be hanging out with thugs and thieves. Yet somehow, I find myself surrounded by the educated elite in every aspect of my life. I work at an astronomical observatory, and interact with Ph.D. astronomers on a daily basis. With my passion in herpetology, some of my closest friends carry a Ph.D. Heck, I'm even married to a Ph.D. In short, my life can be harkened to that tiny nugget of chicken amongst the vowel and consonant-shaped noodles in a bowl of alphabet soup.

Most people who were lucky enough to avoid the process of obtaining a Ph.D. have only a rudimentary idea of what it takes to get one. As I have been blessed to work, play and live closely with those involved in the process, I get the general idea. It is similar to serving an eight-year sentence in prison on a hunger strike. But instead of forced feeding, they endure forced reading—by the piles. Not only do they have to read a lot, they have to read stuff that was deliberately created boring just to torment them. How about long hours of fieldwork, coupled with multiple classes and tests? And then, they are also expected to write long and boring papers just so that they can torture future generations of those following in their wake. It is a vicious and never-ending cycle—a butcher shop for the brain. The human brain can only take so much. Eventually, this kind of input begets output that leaks through the ears and nasal passages. While the stuff that academia requires remains inside the head, certain other important skills, such as how to operate door knobs, or why a toilet seat has hinges, leaks out.

In other words: "This is your brain. This is your brain on Phud." (Any questions?)

It has been my privilege to work with some of the finest minds in herpetology today. I have learned and continue to learn from some very sharp minds. They have been gentle and wise in their teachings. For this reason, I feel compelled to watch over them. I must be ready to explain things such as door knobs and toilet seat hinges. And most of all, when their brains are suddenly on Phud, I have to be there for them. A few examples of brains on Phud follow. The names have been changed to protect the guilty.

One fine, sunny morning in May, our vehicle was whistling northward. We were halfway to our destination, which could best be described as the middle of nowhere, when my passenger piped the following words:

"Oh crap! We gotta turn back!"

As these words were uttered, this individual suddenly seemed to grow eight arms, which were set in motion frantically unzipping every compartment in his backpack. The pack was then tipped upside down, and a pile of herper's paraphernalia began to spew out onto the seat between us. When I make the effort to arise at 0400 hours in order to exploit herpetological prime time in the middle of nowhere, requests to turn back are not taken lightly.

"Turn back? What for?"

"I forgot my hat. I can't go into the field without my hat."

As he is saying this, his eight hands are all sorts of groping around the innards of his now-barren pack, as if said hat might be the size of a grain of rice. Circumstances being what they were, I could not help but have a little fun with this situation.

"C'mon, you ***sissy***! We have to turn around because you forgot your hat? You're looking a little pale anyhow—you could use a tan, you know!"

"Dammit Repp, I'll get skin cancer. See this scar here?" (He

points to a minute white crater, slightly smaller than the average zit), "that's where they cut some melanoma out. If I don't wear a hat today, I'll be dead!"

"Hey, once you're dead, could I have your Whitney tongs?"

"I'm not kidding Roger! Turn this vehicle around! I can't go out without my hat."

For a full 10 minutes, the discussion continued, growing ever-heated from the "hatless" side of the vehicle. I finally started laughing, which was sort of a mistake. It was like laughing at a funeral.

"Stop *laughing*! This is *not* funny! This is a matter of life or death! Now, are you going to turn around, or not?"

"No! I am ***not*** going to turn around."

"Yuh know, Repp, sometimes I *really* hate you! How can I make you see how important this is? Please tell me why you won't turn around . . . "

"Ok, *idiot*!" I scoffed, and scornfully added "the reason I'm not going to turn around to get your hat is ***because it is on your head*!"**

I turned to note the look of disbelief on the beet-red visage of my passenger. A trembling hand reached upward, felt the brightly red-colored rim of his hat, and then came the sound of defeat:

" . . . oh . . . I suppose I'll hear about this again someday?"

"Count on it!"

Yes, examples of errant thought patterns created by excessive learning abound. Take the time that I was out with my old buddy Jacques Strap. We approach a cattle gate stretched across the dirt road we are traveling on. Said gate blocks further attempts to keep moving ahead, so the driver pulls up to it and stops. Jacques stares at the gate from his shotgun seat as if it is the eighth wonder of the world. The driver waits patiently a moment—a very short moment—and makes the following utterance:

"Off your ass, and earn your ride."

This rather rude statement is effective, and sets Jacques into motion. The gate is opened, and the vehicle passes through. Next comes the tricky part—the closing of the gate. This Jacques manages to do with but minimal difficulty. There is but one problem: The vehicle is on one side of the gate, and he is on the other. The driver is once again patient. But this is patience with a purpose. The driver wants to see how long it will take Jacques to figure out what has just happened. Several minutes later, the driver finally cracks.

"Hey Jacques!" He yells, "am I on the wrong side of the gate? You want I should back through it for you?"

Poor Jacques is confused. He's really having a problem with this situation. He knows that something is wrong, but he can't quite put his finger on it. He's looking at the gate, and he's looking at the vehicle on the other side of the gate. Somehow, the thought process of opening the gate and stepping through it is blocked by whatever is raging through his brain on Phud. The poor guy's inner computer has completely locked up. It is up to the driver to push the reboot button. He steps out, and instantly notes the vacant expression in the eyes of his comrade. The driver approaches the passenger cautiously, and in soothing tones, says "it's all right Jacques. Here's what I'm going to do. I'm going to open the gate, ok?" (The vacant stare is still unwavering.) "I'm opening the gate Jacques. See—it's open now." (The driver reaches out and puts his hand on Jacques' shoulder.) "Ok buddy, now, come on through the gate with me—that's it. Here, let me get the door for you now. Have a seat, duder! That's it! Now—I'm going to go close the gate, and you just stay right here, ok?" Two minutes later, we're rolling again, and Jacques is his old self again. Scary!

Then there's the time that Ben Gay and I were involved with a telemetry study on rattlesnakes. We were starting to work with Black-tailed Rattlesnakes (*Crotalus molossus*), which seemed to be rare on our plot. As we were just starting this aspect of the study, we were in the envious situation of having transmitters to burn, but only two *molossus* tagged. Those familiar with this concept will understand that the idea at this point is to get as many wired snakes as possible into the game as quickly as possible. Especially if said snakes are hard to come by in the first place.

Very late one night, Ben and I tracked a female *molossus* to a packrat midden. We looked into a promising entranceway of the midden, and saw not one snake, but two! The signal clearly revealed that only one was "ours." The other was new. And so, in the dead of night, amidst harsh vegetation so thick that we can only look into the hole one person at a time, we had to make our decision. Mr. Wideawake here was first to speak a plan. "Ok Ben," he whispered, "we got our female in the hole. It's most likely that we got a male with our female. If that's the case, the male will likely be the one up front. I'm going to snag that one, and get out of the way so you can snag the one behind it."

This could have been a good plan, and might have worked save for two deviations on the part of the snakes: 1. The snake up front was our female and 2. The snake in back was extremely wary. I saw the painted rattles on our female as soon as I snagged her from the hole. I got out of the way as quickly as possible to let Ben to make his stab. Too late! The other snake shot deeper into the hole, the sound of the rattling diminishing as it slid out of sight. Well, rats! We had the wrong bird in the hand, and the wrong bird in the bush as well. There was not much else to do but start checking the vitals on the one in the hand. Midway through this process, Ben looked over my shoulder and got all sorts of wide-eyed. I turned around to see what was up. For whatever reason, the snake that had escaped was emerging out of a different hole! It was crawling across the top of the midden—heading right for us. Ben was on him like scum on a pond, and he was ours. He was a hefty dandy of a *molossus*, and would be a stellar addition to the study. Prior to any surgery, there were always vital stats that must be taken at the point of capture. The female was already processed; it was now time to do the male. Following this miserable process, it was time to release the female, whose transmitter still had considerable battery life in her transmitter, back into the game. Ben saw me gently set the female into the hole from which she came. And

then came his brain on Phud. In the worst case example I've ever witnessed of monkey see, monkey do, Ben then put our new male into the same hole. I was speechless for a moment as the second snake started slithering down the hole.

"Uh, Ben? Did you decide that you don't want to put a transmitter in this snake after all?"

"Doop!" Came Ben's response. He belly flopped to the ground, tongs jabbing wildly into the depths of the hole. Somehow, some way, he managed to get hold of the escaping viper and pull it back out. This was good for a couple yuks on my part, and some self-administered forehead slapping on his. He puts the snake back in the hole? Yegads!

Well, I'm just getting started, but maybe it's time to stop? Nope! We have one more to relay, and then I'll stop picking on Phuds.

I was working with an out-of-stater, Pete Moss, on a different rattlesnake project. He was coming from back east for week-long stints, and we would grind from dawn to dusk. We would then go to whatever place was convenient for the surgeries, and go back out the following day to release whatever was processed and do it all again. On our very last day together, we caught six rattlesnakes that needed transmitters. We worked long into the night to get all six wired up. We carefully packed all our equipment—we were done with everything. Then came the welcome relief of a bed. We agreed that we would sleep late the following morning to try to recover from the grueling week that we had spent together.

I got up way too early, only to find that Pete had arisen earlier yet. He had dragged everything that we had so carefully packed the night before back out. He was setting up tubes, getting syringes ready, lining up datasheets, PIT tags, reader—the whole nine yards.

Still groggy, and more than irritated with him for being up and about at such an unchristian hour, I growled "Pete! What the hell are you doing?"

"What do you mean 'what the hell am I doing?' Was his reply, "we have some surgeries to do this morning, remember?"

"No, Pete! We did those last night. Do *you* remember?"

Pete kind of gave me that "Jacques-at-the-gate" look. It was that same vacant stare, and then, a glimmer of sheepishness drifted across his visage. His mouth then formed around these words: "Go light on me, ok?"

On behalf of those of us who work with the brightest and best in the trenches, I wish to thank each and every one of you Phuds for your patience and instruction through the years. I also encourage those of you who, like me, haven't been through the living nightmare of an advanced degree to "go light" on our learned friends. After all, they need us as much as we need them.

This here is Roger Repp, signing off from southern Arizona, where the turtles are strong, the snakes are handsome, and the lizards are all above average.

Minutes of the CHS Board Meeting, July 14, 2017

Vice-president Jessica Wadleigh called the meeting to order at 7:35 P.M. Board members Dan Bavirsha, John Bellah, Lisette Chapa, Rich Crowley and Morgan Lantz were absent. The minutes of the June 16 board meeting were read and accepted.

Officers' Reports

Treasurer: Andy Malawy read through the financial report. There was discussion of a possible dues increase.

Membership secretary: Mike Dloogatch read the list of expiring memberships. There was discussion of sending renewal notices by email in addition to regular mail.

Sergeant-at-arms: Attendance at the June 28 general meeting was 28.

New Business

Dick Buchholz is looking for someone who can pick up raffle items from our storage facility each month and bring them to the general meeting.

The meeting adjourned at 8:20 P.M.

Respectfully submitted by recording secretary Gail Oomens

Herpetology 2017

In this column the editorial staff presents short abstracts of herpetological articles we have found of interest. This is not an attempt to summarize all of the research papers being published; it is an attempt to increase the reader's awareness of what herpetologists have been doing and publishing. The editor assumes full responsibility for any errors or misleading statements.

DEVELOPMENT OF MONITOR EGGS

R. M. Andrews et al. [2017, Journal of Herpetology 51(3):396-401] note that *Varanus rosenbergi* females oviposit in nests excavated in termite mounds in summer, and hatching occurs the following spring after a seven-month incubation period. This study characterized developmental features associated with the prolonged incubation of this species at Kangaroo Island in South Australia. Oviposition occurs shortly after limb buds have formed, and the subsequent pattern of organogenesis is similar to that of other lizards. Survival of eggs incubated at constant temperatures ranging from 26–33 °C was 89–100%, whereas survival at 24 °C and at 35 °C was 0 and 14%, respectively. During the incubation period, mean ambient temperature at Kangaroo Island (14–15 °C) is too low for successful reproduction, whereas mean temperatures in termite mounds (27–37 °C) are substantially warmer and similar to the estimated mean incubation temperature (26–27 °C). Therefore, successful reproduction by *V. rosenbergi* in southern Australia may be contingent on nesting in termitaria. Varanids, in general, have incubation lengths that are substantially longer than those of most other squamates, turtles, and crocodilians. The authors hypothesize that varanids have prolonged incubation lengths primarily as an adaptation to maximize hatchling fitness because their emergence from nests in the warm and/or wet season of the year following oviposition is the time most favorable for growth and survival. Other factors that may contribute to prolonged incubation are the developmental costs of a large brain and the energy costs associated with nest locations and substrates that may make emergence difficult for hatchlings.

RESPONSES OF LIZARDS TO ASH

M. Mora and A. Labra [2017, Journal of Herpetology 51(3): 388-395] note that fires and volcanic eruptions produce ash that may negatively affect survivors of the disturbances themselves. Therefore, animals are expected to avoid areas covered by ash when possible. The authors tested this prediction by determining the substrate selection, ash vs. soil, in two insectivorous *Liolaemus* lizard species. Each species was exposed to the type of ash it is most likely to encounter in its habitat: fire ash for *Liolaemus lemniscatus* and volcanic ash for *Liolaemus pictus*. The authors also determined the ability of these species to track insect scents in ash, as the effectiveness of scent tracking, and hence the ability to find food, may be reduced in ash. Contrary to expectations, both species explored ash more than soil, and they were able to detect insect scents in ash. It was concluded that at least shortly (e.g., days) after a disturbance involving ash production, surviving lizards may not avoid ash that may have negative impact on their health. Lizards would be able to find insects in substrates covered by ash by tracking their scents, however, suggesting that starvation may not necessarily be an immediate cause of mortality after a fire or a volcanic eruption.

DIMORPHISM IN THE MIDLAND PAINTED TURTLE

P. D. Moldowan et al. [2017, Chelonian Conservation and Biology 16(1):76-82] note that the ability to identify the sex of animals accurately is important in population studies. Emydid turtles (Testudines: Emydidae) demonstrate a number of sexually dimorphic characters, including head (cranial) size and structure. Field observations from a long-term study of midland painted turtles (*Chrysemys picta marginata*) in Algonquin Provincial Park, Ontario, Canada, suggested distinct differences in external head morphology between the sexes. The authors evaluated these putative sexual differences in *C. picta* head morphology by conducting a visual questionnaire involving human observers of varying levels of experience (novice, beginner, intermediate, and advanced). Observers were capable of distinguishing the sexes based solely on head morphology with a high degree of accuracy (between 79% and 86% success) across experience levels. Observers identified head shape as a defining character distinguishing the sexes. The authors suggest that visual questionnaires are a quantifiable method of assessing dimorphic characters that can be used in addition to traditional morphometrics or geometric morphometrics to demonstrate a visual, rather than simply statistical, difference among characters and sexes. Despite the breadth of research conducted on *C. picta*, this study is among the first to describe, assess, and discuss the functional significance of head dimorphism in this model species.

A NOVEL FORM OF CAMOUFLAGE

W. G. Ryerson [2017, Copeia 105(2):363-367] notes that different types of animal camouflage ultimately have one function: avoiding detection. The most common form of camouflage, background matching, involves color patterns that match the surrounding environment while the individual remains motionless. However, in a dynamic environment, movement could also contribute to camouflage. For example, reverse crypsis or motion dazzle employs color patterns that can disrupt the pattern of motion to aid in concealing an individual, or by making it more difficult to track the individual's movements. This paper describes a new form of behavioral camouflage in colubrid snakes. The behavior consists of a series of small, laterally oscillating movements. Observed in three colubrids (*Thamnophis sirtalis*, *Thamnophis sauritus*, *Opheodrys vernalis*), the author hypothesizes that this behavior serves to blend the dorsal patterning of a snake with moving vegetation. Through 73 observations in *T. sirtalis*, the head-wobble was only observed being performed by small snakes in grassy/reedy areas while the wind was active. In the case of both species of *Thamnophis*, this may match the movement of grass in the wind with the dorsal stripe on the snake, and help a snake avoid potential predators.

ORIENTATION DURING NEST DISPERSAL

M. J. Pappas et al. [2017, Chelonian Conservation and Biology 16(1):3-11] released hatchling river turtles (smooth softshell turtles, *Apalone mutica*; spiny softshell turtles, *Apalone spinifera*; northern map turtles, *Graptemys geographica*; false map turtles, *Graptemys pseudogeographica*; and Ouachita map turtles, *Graptemys ouachitensis*) in a variety of settings to help place orientation and dispersal from nests in the context of nest site selection by females and juvenile recruitment habitat. Visual cues associated with near open or far dark horizons were the primary environmental cues used during initial orientation and dispersal of the hatchling river turtles. On a river beach, hatchlings of both species of softshell turtles dispersed toward the open horizon of the nearby river. In contrast, hatchlings of all three species of map turtles on the same beach dispersed toward the near dark horizons of a forest that led them away from the river. Hatchling map turtles of all three species released in autumn and northern map turtles also released in spring at a field arena dispersed toward near dark horizons of pine (*Pinus* spp.) and deciduous trees to the north and south of the arena (directions that were parallel to the Mississippi River). At a site in upland prairie habitat with no nearby wetlands, hatchlings of all three species of map turtles dispersed to the north toward near dark horizons of an oak (*Quercus* spp.) forest rather than toward more distant dark horizons of mixed oak and pine trees. At a lowland prairie site where no near dark horizon was visible, northern map turtles dispersed toward two far dark horizons that were ~230 m to the north (a pond surrounded with trees) and to the south (an area of large deciduous trees at the west end of a windrow of pine trees), but not toward the large riparian wetland 280 m to the west. The bimodal dispersal pattern toward two equidistant dark horizons within 230 m but not toward the riparian area 280 m to the west suggests that the perception distance for hatchling northern map turtles is between 230 and 280 m. Dispersal of a combined sample of naïve hatchling false map and Ouachita map turtles released in a mature corn field was not different from random, but the directions taken by the majority of hatchlings were to the north and south across corn rows that may be the closest match to dark horizons used for dispersal in typical habitats.

ROADSIDE MOLE TUNNELS AS NESTING AREAS

R. Meek [2017, The Herpetological Bulletin 139:16-19] notes that the presence of oviparous reptiles in relatively cool climates is mostly due to the ability of reproducing females to locate nest sites with appropriate thermal regimes. In northern Europe the grass snake (*Natrix natrix*) is well known for exploiting anthropogenic derived heat sources to aid egg incubation. This paper documents, for the first time, *N. natrix* repeatedly exploiting roadside areas for egg-laying where females oviposited in tunnels of the mole *Talpa europea*. Temperatures in the tunnels were higher than dummy nest temperatures in shaded, partially shaded and sunlit areas around the nesting area but in good agreement with the temperatures of a dummy nest at a similar distance from the road edge. Hatching success in six clutches ranged from 87.5 to 100%. These results suggest a thermal benefit from heat from roadside tarmac for egg incubation.

NEW TOAD SPECIES FROM NORTHERN NEVADA

M. R. Gordon et al. [2017, Zootaxa 4290(1):123-139] describe *Bufo* (*Anaxyrus*) *williamsi*, a new species of toad from the Great Basin region of northern Nevada belonging to the *Bufo* (*Anaxyrus*) *boreas* species complex. This cryptic species was detected through genetic analyses of toad populations sampled throughout the Great Basin and the morphological evidence was quantified through extensive sampling of live toads within the region. The new species has the smallest body size in the species complex, and can be further diagnosed from other species in the complex by its large tibial glands and unique coloration. The known distribution of the new species is restricted to an area less than 6 km^2 in Dixie Valley, Churchill County, Nevada. The Great Basin is an arid region where aquatic resources are both rare and widely scattered, making habitat suitable for anuran populations highly vulnerable to anthropogenic change. The habitat occupied by this newly described species is threatened by the incipient installation of geothermal and solar power development projects that require the water that defines its habitat.

RODEO™ HERBICIDE NEGATIVELY AFFECTS CRICKET FROGS

K. L. Krynak et al. [2017, Journal of Herpetology 51(3):402-410] note that disease-associated mortality is a leading cause of amphibian declines and extinctions worldwide. Understanding the influence of land-management practices, like herbicide use, on amphibian immune defense traits could guide changes to improve conservation outcomes. Amphibians are partially protected from pathogens by two skin-associated immune defense traits: bacterial communities inhabiting their skin, and antimicrobial peptides secreted by the skin. Utilizing the Blanchard's cricket frog (*Acris blanchardi*), a declining North American amphibian species, as a model, the authors manipulated Rodeo™ aquatic herbicide concentration and the life stage at which Rodeo exposure occurred. We assessed juvenile survival, time to metamorphosis, juvenile mass, and skin-associated immune defense traits. They found a 37% decrease in survival of larvae exposed to 2.5 mg a.e. L-1 (acid equivalent) compared to controls despite that this commercial herbicide formulation does not contain an added surfactant. Surviving larvae exposed to 2.5 mg a.e. L-1 Rodeo had structurally different larval skin bacterial communities compared to controls. Larval Rodeo exposure did not carry over to postmetamorphic traits (juvenile mass, juvenile skin bacterial community, juvenile natural peptide secretions). Rodeo treatments did not affect time to metamorphosis or juvenile survival. Rodeo concentration had marginally significant effects on juvenile mass and the juvenile skin bacterial community. This study suggests glyphosate-based herbicide use may indirectly contribute to disease-related amphibian declines by altering the skin bacterial community that can provide pathogen resistance. Improving our knowledge of the influence of herbicide use on amphibians across life stages provides an opportunity for changes to application strategies to protect amphibian health or at minimum, lessen negative effects of the practice.

A NOVEL BAIT FOR EASTERN MUD TURTLES

E. C. Munscher et al. [2017, Southeastern Naturalist 16(2): 252-260] note that freshwater-turtle ecologists rely on effective baits to capture target species. The authors conducted a bait-preference study for *Sternotherus odoratus* (eastern musk turtle) in 2 phases during the 2014, 2015, and 2016 field seasons at Comal Springs, New Braunfels, Texas. During Phase 1, they compared the effectiveness of buffalo chicken to other malodorous or previously used successful baits for capturing eastern musk turtles. During Phase 2, they compared catch rates when using buffalo chicken, raw chicken, or fried chicken as bait. They also tested for differences in the effectiveness of buffalo chicken as a bait choice between sexes and among seasons. During Phase 1, they captured 231 of 276 eastern musk turtles (84%) in traps baited with buffalo chicken. During Phase 2, they captured 46 of 72 eastern musk turtles (63.9%) in traps baited with buffalo chicken. Significantly more turtles were captured using Buffalo chicken in comparison to all other baits. These results indicate that buffalo chicken is an effective novel bait that could be used to increase capture rates of eastern musk turtles. Additional studies are needed in other portions of the eastern musk turtle's range to determine if the attraction to buffalo chicken as a trap bait is a local or widespread phenomenon.

TRACKING CHINESE GIANT SALAMANDERS

L. Zhang et al. [2017, Journal of Herpetology 51(3):417-424] note that captive breeding and reintroduction have been increasingly used to restore endangered amphibians worldwide. Knowing habitat requirements for targeted species will help to enhance post release settlement and contribute to the success of reintroduction projects. To collect critical information on habitat requirements of the poorly documented Chinese giant salamanders (*Andrias davidianus*), the authors reintroduced 31 juveniles at two streams in central China and monitored them through radio telemetry from May 2013 to September 2014. They recorded 14 environmental variables twice a month (except during winter) at salamander locations and random locations. They also conducted transects systematically along streams to collect data on environmental variables and prey species. Habitat selection by salamanders was examined at two spatial scales: home-range scale and stream-reach scale. At the home-range scale, water quality variables were not different between salamander locations and random locations, although salamanders were found in deeper water, used larger boulders, and were closer to boulders. Regression models confirmed that presence of salamanders was positively associated with boulder size, river depth, and canopy cover but negatively associated with distance to boulders. At the stream-reach level, only the average water velocity was lower within home ranges than out of home ranges; however, no difference was found between core home ranges and out of home ranges. These results showed that large boulders were the most important variable selected by salamanders. Plenty of large boulders in the streams, together with evidences of postrelease growth of salamanders, indicate the two streams likely are providing suitable habitat for salamanders.

FORAGING BY WILD HAWKSBILL TURTLES

L. D. Wood et al. [2017, Chelonian Conservation and Biology 16(1):70-75] report that foraging behavior from 30 wild hawksbill turtles (*Eretmochelys imbricata*) was video-recorded by scuba divers on the coral reefs of Palm Beach County, Florida. A transition matrix was created to calculate the sequence and frequency of five behavioral categories leading to prey ingestion, and general observations associated with foraging behavior were described. Likely aided by olfaction, the hawksbills at this site employed a multistep process to preferentially locate and ingest well-concealed sessile invertebrates, notably poriferans of the class Demospongiae. Cumulatively, behavioral frequencies decreased as the sequence progressed toward prey consumption, and only a small proportion of the items handled were ingested. Highly exploratory foraging behavior may aid hawksbills to adaptively identify and prioritize dietary preferences within and among habitat types.

CLIMATE AND GIANT FOSSIL TORTOISES

D. Moll and L. E. Brown [2017, Herpetological Journal 27(2): 276-286] note that over a half-century ago, C. W. Hibbard proposed a climate theory based on imported living giant tortoises ("*Geochelone*") as proxies that suggested the climate adaptations of giant fossil tortoises of the Cenozoic Era (65.5 million years ago to present) were subtropical or tropical across much of North America. This has been a prominent and enduring paleoclimate theory. The authors show that incorrect assumptions and other problems invalidate this theory. Seven alternative concepts are presented that suggest North American fossil giant tortoises could have evolved necessary adaptations including cold-adaptive morphology, behavioral thermoregulation, burrowing, use of caves as shelters, tolerance of prolonged cessation of food consumption, cryoprotection and supercooling (protection from freezing), and gigantothermy (metabolic and structural thermoregulation) to survive northern winters and in montane areas. This study illustrates the potential danger of using an inappropriate proxy to predict past climates.

HELLBENDER DIETS

K. A. Hecht et al. [2017, Southeastern Naturalist 16(2):157-162] note that organisms in lotic habitats often experience dietary shifts over their lifetime. The diet of adult *Cryptobranchus alleganiensis* (hellbender) is well studied throughout the species' range, but knowledge regarding the natural history of larval hellbenders, including dietary information, remains scarce. The authors obtained non-lethal diet samples from 23 larval hellbenders. Larval hellbenders consumed primarily invertebrate prey including mayfly (Ephemeroptera) and caddisfly (Trichoptera) nymphs. Since these items do not comprise a large proportion of the adult diet, hellbenders may undergo an ontogenetic dietary shift. Therefore, future management and conservation decisions regarding the hellbender should consider the abundance and density of aquatic insect populations.

Advertisements

For sale: **highest quality frozen rodents**. I have been raising rodents for over 30 years and can supply you with the highest quality mice available in the U.S. These are always exceptionally clean and healthy with no urine odor or mixed in bedding. I feed these to my own reptile collection exclusively and so make sure they are the best available. All rodents are produced from my personal breeding colony and are fed exceptional high protein, low fat rodent diets; no dog food is ever used. Additionally, all mice are flash frozen and are separate in the bag, not frozen together. I also have ultra low shipping prices to most areas of the U.S. and can beat others shipping prices considerably. I specialize in the smaller mice sizes and currently have the following four sizes available: Small pink mice (1 day old—1 gm) , $25 /100; Large pink mice (4 to 5 days old—2 to 3 gm), $27.50 /100; Small fuzzy mice (7 to 8 days old—5 to 6 gm) , $30/100; Large fuzzy mice / hoppers (10 to 12 days old—8 to 10 gm), $35/100 Contact Kelly Haller at 785-234-3358 or by e-mail at kelhal56@hotmail.com

For sale or trade: Probable pair of albino Harquahala rosy boas. They were born in my home in late 2016 and are feeding on f/t peach fuzz mice. Pure locality animals exhibiting a recessive gene. Viewing is possible, parents on site. I can drive to meet a reasonable distance, or ship if you are not local. Discount if you pick them up from my home. Cash, credit card or PayPal. Call or text 510-318-1715, or email elenabmoss@gmail.com.

Herp tours: **Costa Rica herping adventures**. Join a small group of fellow herpers for 7 herp-filled days. We find all types of herps, mammals, birds and insects, but our target is snakes. We average 52 per trip, and this is our 10th year doing it. If you would like to enjoy finding herps in the wild and sleep in a bed at night with air-conditioning, hot water and only unpack your suitcase once, instead of daily, then this is the place to do it. Go to our web-site http:// hiss-n-things.com and read the highlights of our trips. Read the statistics of each trip and visit the link showing photos of the 40 different species we have found along the way. E-mail at jim.kavney@gmail.com or call Jim Kavney, 305-664-2881.

Line ads in this publication are run free for CHS members—$2 per line for nonmembers. Any ad may be refused at the discretion of the Editor. Submit ads to mdloogatch@chicagoherp.org.

NEW CHS MEMBERS THIS MONTH

Craig Berg
Jeff Bocek
Jennifer Collins
Kayla Cornblath
Christopher Hann
Jason Juchems
Melissa Resendez
Katie Rulkowski
Brian Wawczak

SHOW SCHEDULE

In addition to ReptileFest the Chicago Herpetological Society puts on many live animal displays throughout the year. The events now scheduled for April through July are listed below. CHS members who wish to participate in an event should call or text ahead to Show Coordinator Dick Buchholz, 805-296-9516, to confirm.

- Notebaert Nature Museum, first full weekend of each month, Saturday and Sunday, 10 A.M. – 3 P.M.
- All Animal Expo, first Saturday & third Sunday of each month, 10 A.M. – 3 P.M., Dupage County Fairgrounds, Wheaton.
- Meet the Creek, September 16, Noon – 4 P.M., Kiwanis Park, Brookfield.
- Northern Illinois Hunting & Fishing Celebration, September 23–24, 9 A.M. – 5 P.M., Silver Springs State Park, 13608 Fox Road, Yorkville.
- Glen Ellyn Library, 110th Anniversary, October 14, Evening for adults only.
- Chicago Pet Show, November 11–12, 10 A.M. – 5 P.M., Kane County Fairgrounds, 525 S Randall Rd., St. Charles.

Chicago Herpetological Society

PICNIC @ the WDC

Sept 9, 2017 11am - 3pm

Wildlife Discovery Center
1401 Middlefork Dr,
Lake Forest, IL 60045

Please bring a dish to share and shoes for hiking!!

Please RSVP to either:
Kim - kimklisiak@gmail.com or
Colleen - supermanatee79@gmail.com

The Wildlife Discovery Center has a large collection of reptiles, including venomous and endangered, plus birds of prey, a bobcat and more. We will be grilling hotdogs and hamburgers. Pop and water will be available. Please bring a dish or desert to share, and be prepared to go trail hiking!!!

****Please do not bring any animals****

2017
Midwest Herpetological Symposium

October 20, 21, and 22, 2017

Hosted by the

MINNESOTA HERPETOLOGICAL SOCIETY

The event will be held at:
Best Western Hotel
1901 Killebrew Dr, Bloomington, MN 55425
Phone: (952) 854-8200
(just a block from Mall of America!)

- *Ice Breaker*
- *Speakers*
- *Videos*
- *Photography*
- *Hospitality Room*
- *Auction*
- *Banquet*
- *Vendors*
- *Live Reptile Display*
- *and more!*

SPEAKERS

FRIDAY NIGHT ICE-BREAKER
Dav Kaufman & Jeff LeClere — Field Herpetologists
Herpers, Herpers 2, and Herpers 3 DVDs

SATURDAY PRESENTATIONS
Michael Starkey — Save the Frogs; International Events Coordinator —"The Amphibian Extinction Crisis; Current threats facing amphibians and what you can do about it"

Matt Goode PhD — Viper Institute; School Nat Resources and Environment, U of Arizona
"Ecology and Conservation of King Cobras in India and Southeast Asia"

Anne Stengle PhD Candidate — University of Massachusetts
"Shake Rattle and Roll, From Snake Fungal Disease to the Quabbin Rattlesnake Introduction"

Barney Oldfield DVM — Crotaphytus Photographer, Hesperus, Colorado — "Crotaphytology"

Michael Ogle — Curator; Department of Archelosaurs & Lepidosaurs, Zoo Knoxville
Chelonian Captive Breeding Techniques

KEYNOTE PRESENTATION
Whit Gibbons PhD — Professor Emeritus of Ecology, University of Georgia — "Their Blood Runs Cold: Adventures with Reptiles and Amphibians"

Come for the talks –
Stay for the fun.
Hope to see you!

Registration forms at:
https://mnherpsoc.org/midwest-herpetological-symposium

UPCOMING MEETINGS

The next meeting of the Chicago Herpetological Society will be held at 7:30 P.M., Wednesday, August 30, at the Peggy Notebaert Nature Museum, Cannon Drive and Fullerton Parkway, in Chicago. **Dr. Linda Yang** will speak about reproductive disorders in amphibians and reptiles. Dr. Yang is a veterinarian at the Niles Animal Hospital. She was born in Beijing, China, and immigrated to the U.S. when she was two years old. During veterinary school, Dr. Yang was very active with the Wildlife Medical Clinic, a non-profit student-run clinic dedicated to helping injured wildlife and educating the public about wildlife conservation. She has a special interest in holistic medicine and acupuncture as an alternative or additional therapy for all species.

The speaker at the September 27 meeting has not yet been confirmed.

The regular monthly meetings of the Chicago Herpetological Society take place at Chicago's newest museum—the **Peggy Notebaert Nature Museum**. This beautiful building is at Fullerton Parkway and Cannon Drive, directly across Fullerton from the Lincoln Park Zoo. Meetings are held the last Wednesday of each month, from 7:30 P.M. through 9:30 P.M. Parking is free on Cannon Drive. A plethora of CTA buses stop nearby.

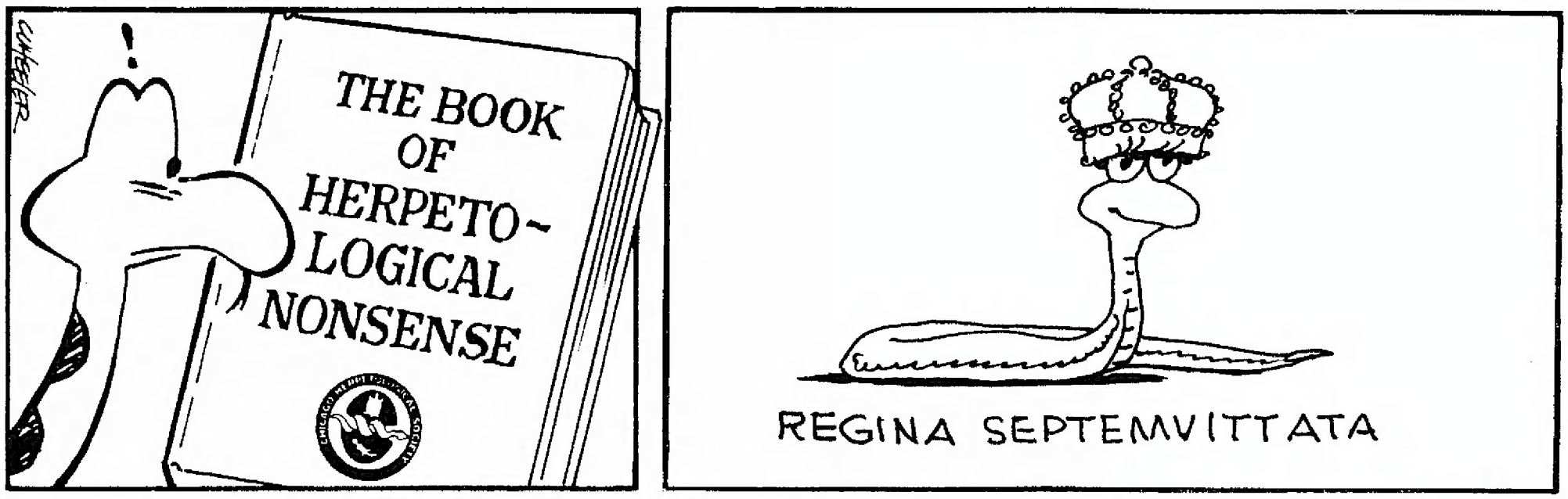
Board of Directors Meeting

Are you interested in how the decisions are made that determine how the Chicago Herpetological Society runs? And would you like to have input into those decisions? If so, mark your calendar for the next board meeting, to be held at 7:30 P.M., Friday, September 15, 2017, at the Schaumburg Township District Library, 130 S. Roselle Road, Schaumburg.

The Chicago Turtle Club

The monthly meetings of the Chicago Turtle Club are informal; questions, children and animals are welcome. Meetings normally take place at the North Park Village Nature Center, 5801 N. Pulaski, in Chicago. Parking is free. For more info visit the group's Facebook page.

THE ADVENTURES OF SPOT



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